Guidelines for the Determination of Natural Filtration Log Removal Credit for *Giardia*

NOVA SCOTIA

Environment and Labour

Approval Date: January 10, 2006	Effective Date: January 10, 2006
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Version Control: New guideline

1. 0 Introduction

Municipal groundwater systems that have been determined to be Groundwater Under the Direct Influence of surface water (GUDI) must meet the requirements of the *Treatment Standard for Municipal Surface Source Water Treatment Facilities*. Depending on the level of surface water influence, the system may be eligible for a 1.0 log natural filtration credit towards the *Giardia* log reduction requirements of the standard. The combination of a natural filtration credit and disinfection (i.e., chlorine or ultraviolet/chlorine) can be used to meet the 3 log *Giardia* requirement of the treatment standard.

Natural filtration refers to the ability of an aquifer to remove microscopic particulates, such as *Giardia*, as groundwater migrates through the aquifer towards a water well. Natural filtration is most appropriately applied as one component of a treatment process and is best suited to systems with minimal influence of surface water.

The purpose of this guideline is to outline the criteria for determining which groundwater systems in Nova Scotia are eligible for a natural filtration log removal credit for *Giardia* and describe how to apply for this credit.

2. 0 Eligible Groundwater Systems

Municipal groundwater systems are eligible for a natural filtration log removal credit if they meet all of the following three conditions:

1. All three steps of the *Protocol for Determining Groundwater Under the Direct Influence of Surface Water* (GUDI Protocol) have been completed;
2. The supply has been determined to be GUDI;
3. The supply has been determined to be either low or medium risk, based on the Microscopic Particulate Analysis (MPA) results from Step 3 of the GUDI Protocol.

Municipal groundwater systems are <u>not</u> eligible for a natural filtration credit if they are located in karst aquifers or have been determined to be high risk based on MPA testing.

3.0 Criteria for Awarding a Natural Filtration Credit

Natural filtration log removal credits will be awarded by Nova Scotia Environment and Labour (NSEL) to eligible systems on a case-by-case basis. To be considered for a natural filtration credit, low and medium risk GUDI systems are required to perform at least one additional MPA test to confirm the original MPA results collected during Step 3 of the GUDI study. The additional MPA test should be collected when the well is most susceptible to surface water influence, such as in the spring after a heavy rainfall or snow melt. The results from Step 2 of the GUDI Protocol should be used to help select the most appropriate MPA sampling times (i.e., if there is a 15 day time-of-travel from the surface

water body to the well, then the well should be sampled 15 days after a surface water event). Although not mandatory, testing for *Giardia* and *Cryptosporidium* is also recommended to assess surface water influence. Check with your laboratory to see if *Giardia* and *Cryptosporidium* tests can be done during the MPA test.

If the results of the additional MPA testing confirm the system is low or medium risk, the system is eligible for a natural filtration credit. If the results indicate that the system is high risk, the system is not eligible for a natural filtration credit.

All low and medium risk GUDI systems will receive a 1.0 log removal credit for *Giardia*, unless there are site-specific reasons that indicate a natural filtration log removal credit should not be awarded.

Site specific issues that will be considered when awarding a natural filtration credit include, but are not limited to: the well should not have a history of health-related high turbidity levels in the untreated well water (i.e., > 1.0 NTU); the well head should not lie within the 100 year floodplain of a surface water body; and, the well should not be located within 60 m of a stream that has the potential for stream channel erosion which could reduce the degree of natural filtration over time.

4.0 How to Apply for a Natural Filtration Credit

To be awarded a natural filtration credit, eligible groundwater systems must apply in writing to the NSEL district office where the water system is located. The written request must include the following information for each well:

- ❑ Water supply name;
- ❑ Well name and map showing well location;
- ❑ Confirmation that the well has completed the GUDI Protocol and it has been classed as a low or medium risk GUDI well;
- ❑ Confirmation that the well is not located in a karst aquifer (based on geological maps and well log information);
- ❑ Results from an additional MPA test, taken after the GUDI Protocol MPA samples, to confirm the well is low or medium risk;
- ❑ Raw water turbidity data (if turbidity data exceed 1.0 NTU, then provide raw water bacteria data to confirm the turbidity is not health-related);
- ❑ Confirmation that the well is not located within a 100 year floodplain, this can be done using existing information such as flood maps, local historical knowledge and air photos; (information on how to obtain existing floodplain mapping for some areas of the province is available at the following website: http://www.ec.gc.ca/water/en/manage/flood/e_ns.htm#map); and
- ❑ Confirmation that the well is not located within 60 m of a surface water body that has the potential for stream channel erosion.

Note that the potential for stream channel erosion can be evaluated by examining the history of high-flow and flood events at the site and by reviewing air photographs for evidence of stream channel meander.

Information submitted must be complete and acceptable to NSEL.

The applicant will receive a written response from NSEL indicating whether or not a natural filtration credit will be awarded. Systems that are awarded a natural filtration credit will be required to complete a MPA test every 2 years to confirm the well is not high risk and submit results to NSEL to maintain the credit. If ongoing MPA monitoring indicates the well has become high risk, systems will be required to take corrective action, such as modifying the well construction or providing additional filtration treatment.

Dated: January 10, 2006

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